

he calculated the "form factors" for the species, this being the first attempt of the kind made in India.

Sir David remained in South Africa about twenty years as Conservator of Forests, Cape Colony. During that time he introduced a variety of exotic species, principally conifers and Eucalypts, to supply the colony with the timber which the indigenous forests could not yield. He also caused similar plantations to be established in the Transvaal and the Orange Free State. These planting operations were on a large scale, so that their area amounts now to 75,000 acres; they have been very successful, especially from a financial point of view. Later, Sir David was transferred to British East Africa as director of forest operations, and in that capacity he published a voluminous report on the forests of that Protectorate. He also visited Cyprus and reported on its forests. He paid visits to the Canaries and other tropical and semi-tropical countries, making a special study of the forest vegetation of the last-mentioned. The knowledge thus acquired enabled him to recommend suitable species for introduction to other countries possessed of a similar climate.

In the year 1914 Sir David proceeded with the British Association to Australia, where he remained for two years studying the forest conditions of that country. At the end of that time the Government of Western Australia published for him, in 1916, a full report on Australian forestry and his suggestions as regards future action to be taken by the Governments of these colonies. The report attracted great attention, and Sir Ronald Munro-Ferguson, at that time Governor-General of Australia, expressed the opinion that "nobody has ever written on Australian forestry as Sir David Hutchins has done."

From Australia Sir David proceeded to New Zealand, where he examined the forests, paying special attention to the "Kauri" pine (*Agathis australis*). He urged that the small remnants of that queen of pines should be protected and enlarged. It appears that he died while passing a report on the New Zealand forests through the press. Sir David Hutchins was an enthusiastic

forester, who had amassed a vast amount of knowledge on forestry subjects, and especially on semi-tropical forest vegetation. In spite of his enthusiasm carrying him sometimes too far, he did most substantial service to the Empire, and his friends were pleased to see his merits appreciated by the bestowal of a knighthood some months before his unexpected death.

SIR CHARLES BRUCE, G.C.M.G.

By the death, at the age of eighty-four, of Sir Charles Bruce the country has lost a great scholar and an efficient administrator. The son of an Indian Civil Servant, in his early years Sir Charles devoted himself, mainly in Germany, to philological study, chiefly in Sanskrit and Zend-Pahlavi, and he did valuable work in connection with the great Sanskrit dictionary published by the Academy of St. Petersburg. He was next appointed rector of the Royal College at St. Louis, Mauritius, whence he was transferred as Director of Public Instruction to Ceylon. He returned to Mauritius as Colonial Secretary, and was later appointed Lieutenant-Governor of British Guiana. In recognition of his services he received the knighthood of the Order of St. Michael and St. George. In 1897 Sir Charles returned to Mauritius as Governor, where, with the hearty support of Mr. Joseph Chamberlain, then Colonial Secretary, he carried out important reforms in the public services, and as an administrator gained much popularity among the people of the island, until his retirement from the public service in 1903. During his colonial service of more than thirty-five years he gave much attention to ameliorating the condition of the Indian immigrants to our Crown Colonies, a task to which he devoted himself after his retirement. In 1910 he published an important work, "The Broad Stone of Empire," dealing with the problems of Crown Colony administration in the light of his wide and varied experience. Sir Charles Bruce will be regretted by many friends as a man of devout spirit and of singular independence and honesty of purpose, with much charm of manner and kindness of heart.

Notes.

HIS HIGHNESS THE PRINCE OF MONACO has issued invitations to representative scientific workers of all countries to be present at the formal opening of the Institut de Paléontologie Humaine at 1 rue René Panhard, Paris, to-day, December 23. The President of the French Republic (M. Millerand) has promised to attend. The institute owes its origin to the munificent benefactions of the Prince, whose interest in archaeological problems made possible the systematic exploration of the Mentone caves. Its work is most widely known to archaeologists through the magnificent series of publications covering the exploration of Palæolithic caves, notably those of Grimaldi, Altamira, and La

Pileta. Of the excavations described in these publications some have been undertaken under the auspices and at the expense of the institute. This is especially the case with those of more recent years, such as the exploration of the cave of La Pileta (Malaga), undertaken by MM. Breuil, Obermaier, and Verner. Although it did not undertake the actual exploration of the Altamira cave at Santander, carried out by Dr. Cartailhac and the Abbé Breuil, it was responsible for the publication of the results. It was through the institute and the generous assistance given by the Prince that it was possible for the authors to describe the site and its culture on a scale and with a

wealth of illustration which have made the remarkable series of examples of prehistoric art familiar to archaeologists who are not fortunate enough to be able to visit the cave in person.

MUCH interest has been aroused by the registration on December 16 of one of the greatest earthquakes of recent years, and the interest has been increased by the mystery which at present attends the position of its origin. The first preliminary tremors reached West Bromwich at 12h. 17m. 14s. p.m.; the second tremors arrived nine minutes later, indicating an epicentral distance of about 68° of arc. The oscillations at this station were so violent that Mr. J. J. Shaw's seismograph was thrown out of action. The epicentral distance from Oxford was estimated at 67° . From the American records it would seem that the distance from Washington was about 43° . Various positions have been suggested for the origin—China, beneath the Pacific Ocean to the north of Japan, the Atlantic between Sierra Leone and Brazil, or the South Pacific. Prof. H. H. Turner, writing in the *Times* of December 21, suggested that the place of origin was in the Gulf of Mexico, but since then he has seen evidence which indicates an Alaskan origin for the earthquake. No seismic sea-waves have been reported from any place, and this absence seems to favour an origin that is, at least in part, terrestrial. On the other hand, an earthquake so violent must have been felt to a distance of some hundreds of miles from its origin; and thus, if the origin were terrestrial, it must either be in a country from which outgoing messages have been censored or one with few observers or inadequate means of communication—such, for instance, as Yakutat Bay, in Alaska, which is, however, only about 64° from the British stations.

THE announcement that the King has approved of the appointment of Prof. J. C. Irvine as Principal of the University of St. Andrews has been received with feelings of much satisfaction by men of science throughout the country. This is not the first occasion when the chief administrative office in the oldest University of Scotland has been filled by a man of scientific eminence, for Sir David Brewster occupied the Principalship of the United College from 1838 to 1859, and his successor was J. D. Forbes. After a period of years, during which the University was guided by those men of distinction in the world of letters, John Campbell Shairp, Sir James Donaldson, and Sir John Herkless, it now falls to the lot of a chemist to direct the policy of the University of the grey city by the northern sea. The new Principal was a pupil of Prof. G. G. Henderson in Glasgow Technical College before going to St. Andrews as an undergraduate. He afterwards spent a couple of years in Leipzig, where he came under the inspiration of Wislizenus, returning in 1901 to his *alma mater*. On the retirement of Prof. Purdie in 1909 the chair of chemistry in the United College was filled by his assistant. During the past twenty years Prof. Irvine has devoted himself to research on the chemistry of carbohydrates, in which branch he may now be regarded as the leading living authority. He has been particularly successful in imparting much of his

enthusiasm to his students; many of the men associated with him in his publications in the *Journal of the Chemical Society* are graduates in arts who, with no scientific predilections, were attracted to the study of chemistry by the personality of the professor. Principal Irvine's scientific work was recognised by his election as F.R.S. in 1918, whilst his valuable war services earned for him his C.B.E. in the present year. His many friends in academic circles both in St. Andrews and in Dundee have full confidence that in his hands the best interests of their University are in safe keeping.

THE recent reports relative to a fall of rock involving the summit of Mont Blanc, however improbable they might appear to those who have knowledge of the ground, have naturally aroused general attention. The *Daily Mail* of November 27 published a communication from Geneva correcting the idea that the summit had suffered change, but recording the fall of the face of a rock-precipice on to the Brenva glacier, and the sweeping of an ice-avalanche from this glacier through the woods of "Portud" (La Pertu). The *Journal des Débats* for November 29 quotes information given by M. Vallot, director of the Mont Blanc Observatory, to the *Eclaireur de Nice*. M. Vallot points out that the summit is composed of an ice-mass of variable level, and that the source of the avalanche could not have been determined from the Italian side. Presumably this refers to dwellers in the Val di Veni. M. A. Lacroix, permanent secretary of the Paris Academy of Sciences, very kindly informs us that accurate details are not yet to hand, and that the matter may resolve itself into an avalanche of ice rather than a fall of rock.

A SMALL expedition is being organised in the University of Oxford to visit Spitsbergen next summer with the view of conducting researches in ornithology, botany, and palæontology. Work will be confined mainly to the west coast, but if ice conditions permit the northern and north-eastern shores of the mainland will be visited and an attempt made to cross New Friesland and to ascend some of the unscaled peaks in that part of the country. It is proposed to charter two or three sealing sloops in Norway to accommodate the expedition. The first sloop would arrive in Spitsbergen early in June, making for the bird rookeries on the north and west coasts of Prince Charles Foreland; the others would arrive later for work on the north coast. The explanatory side of the expedition's programme depends largely on weather conditions, but the other researches can certainly be carried out. The staff of the expedition has been selected, and will, we understand, include the Rev. F. C. R. Jourdain, who is chairman of the organising committee. Expert advice is being taken in the preparation of the plans and in the selection of the equipment. The *Times* understands that the cost of the expedition is estimated at about 3000l., towards which several generous contributions have already been promised. The expedition has the official sanction and support of the University of Oxford.

THE Forestry Commission was established in order to secure an adequate supply of home-grown timber,

and many people imagine that this can be effected by State afforestation alone. The 1,770,000 acres which the Government has decided to acquire and plant with trees during the next eighty years are quite inadequate. Much of the planting must therefore be done by private owners, who control about 3,000,000 acres of woodlands. Owing to the war and other causes, the great bulk of mature timber on these estates has disappeared, and in all probability only 750,000 acres are fully stocked with trees more than twenty years old. Certainly a great part of the conifer woods has been either clean-felled or thinned to such an extent as to be no longer productive. The remedy is the encouragement of replanting by private owners, who are now deterred by high wages, the enhanced cost of plants, etc. The Forestry Commissioners are prepared to assist private owners in two ways: either by entering with them into partnership in profit-sharing schemes or by giving grants in aid of planting and of establishing a crop under approved conditions. These grants are fixed at 2*l.* per acre for conifers and 4*l.* per acre for broad-leaved trees, and are repayable whenever an owner makes ultimately a profit exceeding 4 per cent. As the new planting season is in full swing, applications for grants should be addressed direct to the Assistant Commissioner concerned: For England and Wales—30 Belgrave Square, London, S.W.1; for Scotland—25 Drumsheugh Gardens, Edinburgh; and for Ireland—6 Hume Street, Dublin.

THE annual exhibition arranged by the Physical Society and the Optical Society is to be held on Wednesday and Thursday, January 5 and 6, at the Imperial College of Science, South Kensington, and will be open both in the afternoon (from 3 to 6 p.m.) and in the evening (from 7 to 10 p.m.). Sir W. H. Bragg will give a discourse on "Sounds in Nature" at 4 p.m. on January 5. Dr. Archibald Barr will lecture on "The Optophone: An Instrument which Enables the Totally Blind to Read Ordinary Print" at 8 p.m. on January 5 and at 4 p.m. on January 6. After the lecture a demonstration will be given by a totally blind person. At 8 p.m. on January 6 Prof. C. R. Darling will give a discourse on "Some Unusual Surface-Tension Phenomena." All the lectures will be illustrated by experiments. About fifty firms will be exhibiting, and a number of experimental demonstrations have been arranged. We understand that invitations have been given to the Institution of Electrical Engineers, the Institution of Mechanical Engineers, the Chemical Society, the Faraday Society, the Wireless Society of London, and the Röntgen Society. Admission in all cases will be by ticket only, and therefore members of the societies just mentioned desiring to attend the exhibition should apply to the secretary of the society to which they belong. Others interested should apply direct to Mr. F. E. Smith, hon. secretary of the Physical Society, National Physical Laboratory, Teddington, S.W.

THE Imperial Bureau of Mycology is the outcome of a proposal unanimously adopted by the Imperial War Conference in 1918 that a central organisation should be established for the encouragement and co-ordination of work throughout the Empire on the diseases

of plants caused by fungi in relation to agriculture. The committee of management consists of some of the foremost biologists in the country, with Viscount Harcourt as their chairman, and includes the following members:—Prof. I. Bayley Balfour, Dr. W. Bateson, Prof. V. H. Blackman, Prof. F. O. Bower, Mr. R. D. Cotton, Prof. H. H. Dixon, Prof. J. B. Farmer, Capt. A. W. Hill, Prof. W. H. Lang, Sir Daniel Morris, Mr. J. Murray, Mr. G. H. Pethybridge, Sir David Prain, Dr. A. B. Rendle, Mr. H. N. Ridley, Prof. R. A. Robertson, Sir A. E. Shipley, Prof. W. Somerville, and Dr. H. W. T. Wager. Dr. E. J. Butler, late Imperial Mycologist, Director of the Research Institute, Pusa, and Agricultural Adviser to the Government of India, has been appointed Director, and has started work at the headquarters of the Bureau, 17-19 Kew Green, Kew (telephone Richmond 603). The Bureau will work broadly on the lines of the existing Imperial Bureau of Entomology at South Kensington, and will aim at doing for the other great class of destructive agencies in agriculture, namely, the diseases and blights of plants caused by fungi, what the older Bureau has so successfully done in regard to injurious insects. It will be a central agency for the accumulation and distribution of information and for the identification of specimens sent in from all parts of the Empire.

DR. R. H. PICKARD, principal of Battersea Polytechnic, has been appointed director of research to the British Leather Manufacturers' Research Association.

IN the November issue of *Man* Miss M. E. Durham supplements Dr. W. Crooke's article (*Journal of the Royal Anthropological Institute*, vol. xlix.) on nudity in India by some notes of similar practices in North Albania. When a new house is built and ready for habitation, the hearth has to be kindled for the first time ceremonially. The fire is laid and the master of the house strips stark naked, enters the house, and ignites the fire by firing a pistol into it, after which the family takes possession of the house. When a new pair of oxen are yoked together for the first time the owner must be nude when he ploughs the first furrow. Miss Durham also notices that there is no feeling against nudity in the case of men crossing rivers by the aid of inflated sheepskins or of those in charge of ferries. The above two cases, which she regards as probably the only cases of ritual nudity in Europe, if, indeed, they are still practised in a region devastated by war, are deserving of record.

MR. C. G. E. BUNT discusses in *Ancient Egypt* (1920, part iv.) the genesis of Coptic twists and plaits, with the result that he traces them to Sumerian origin. Prof. Flinders Petrie sums up the question thus: "These conclusions on the Sumerian being the earliest forms of the twists and plaits accords with other facts of their distribution. The formula which seems to agree with all the cases is that the twist and plait is a Central Asian motive (see the wickerwork screens in Kirghiz tents); that from there it passed down the Euphrates, also into Syria, and first into Egypt under Hyksos influence. Plaits and twists were unknown in Italy until the Dacian captives were brought in and set to mosaic work; plaits were

brought from the north into the basketwork capitals of Justinian, and the round plait in architecture only occurs in true Gothic work in Italy, the Lombard plait being angular, rushwork and not osiers. In Ireland the spiral is alone in the pagan age, and the plait only comes in after the Norse influences of the Christian period."

AN interesting programme was presented at the meeting of the Association of Economic Biologists held in the Imperial College of Science on Friday, December 10. Sir David Prain occupied the chair, and the first portion of the meeting was devoted to the exhibition of specimens. Dr. B. M. Bristol, of Rothamsted, showed a number of very beautiful pure cultures of algæ on solid media, obtained from the soil of the famous Broadbalk wheat-field, the algal flora of which she is studying. Dr. S. G. Paine exhibited bacteria with flagella stained by a new method, and also a convenient new pattern of incandescent lamp which he has devised for microscopic work. Mrs. Alcock showed specimens of Douglas fir attacked by *Phomopsis pithya*, Lind., a parasitic fungus new to this country; and Mr. W. B. Brierley exhibited a fine photograph of Dr. Erwin F. Smith, the eminent American pathologist. Mr. W. J. Dowson then read his paper on "Problems of Economic Biology in British East Africa," dealing especially with the relations of plant disease to climatic conditions. A second paper was read by Dr. M. C. Rayner on "Nitrogen Fixation in the Ericaceæ," in which a convincing case was stated for the fixation of nitrogen by the mycorrhizal fungus in this genus of plants. The papers were discussed by Dr. E. J. Butler, Mr. F. T. Brooks, Prof. V. H. Blackman, and Dame Helen Gwynne-Vaughan.

IN Bulletin 313 of the Agricultural Experiment Station of the University of Wisconsin Prof. L. J. Cole and Miss Sarah Jones discuss the occurrence of red calves in black breeds of cattle such as Aberdeen-Angus, Galloway, and Holstein-Friesian. They point out that red is recessive to black, and was introduced by crosses in the early days of formation of the breeds, when little selection for colour was practised. The more rigid selection for colour at present in vogue has not yet succeeded in eliminating the recessive factor for red from the germ-plasm. Such a simple account of the cause of the persistent sporadic reappearance of red is valuable for practical breeders who have no knowledge of the scientific principles of heredity. It serves to eradicate many erroneous ideas as to the nature of these occurrences.

It was ascertained by Blacklock and Carter at the Liverpool School of Tropical Medicine in 1919 that the indigenous British mosquito, *Anopheles plumbeus*, could be infected with the malarial parasite *Plasmodium vivax*. As a consequence of this discovery the Mosquito Investigation Committee of the South-Eastern Union of Scientific Societies was asked by the Ministry of Health to aid in discovering the exact distribution of this mosquito in England and Wales. In its Circular No. 4 this committee explains the effort it is making to conduct an inquiry into the

distribution of *A. plumbeus* within the areas to which the activities of its affiliated societies extend. The circular gives detailed descriptions of the egg, larva, and fly of *A. plumbeus* and of its breeding-places, illustrated by plates of figures reproduced from Lang's "Handbook of British Mosquitoes," issued by the British Museum, and from Blacklock and Carter's paper in the *Annals of Tropical Medicine and Parasitology*. These, with further information concerning habits, distribution, collection, etc., should make the circular useful to the amateur and efficient for its purpose. It is clear that the Ministry of Health has a keen ally in this committee of the South-Eastern Union of Scientific Societies.

THE October issue of the Tropical Diseases Bulletin, published by the Tropical Diseases Bureau, consists of a Sanitation Number, and comprises extracts from and notes on papers appearing in various scientific journals and official reports. The matter is divided under several heads, namely: Disease Prevention (chiefly Malaria), Conservancy, Water, Milk, Smallpox Vaccination, Rat Destruction, Disinfection, Vital Statistics, and Book Reviews. Most of the notes and extracts are very brief, but appear to bring out the more salient points of the original papers, and will undoubtedly serve as a very useful guide to the student of this particular subject. The paper to which most space is given is one by Sir Alexander Houston on water and sewage purification, reprinted from the Reports of the Progress of Applied Chemistry. This paper, dealing chiefly with water and sewage problems in this country, has, perhaps, only an indirect bearing on tropical hygiene, but it is, nevertheless, highly important from that point of view in that it deals largely with questions of chlorination of water and with algal infection. An interesting point is that the author states that he has recently discovered a means of preventing or removing the residual or, as he describes it, "iodoform" taste in chlorinated water by means of a small dose of potassium permanganate (2 lb. to 8 lb. per 1,000,000 gallons). This question of taste has always been one of the difficulties in the way of the successful chlorination of water and the cause of many complaints from consumers, and Houston's taste-eliminating process should prove an immense boon where chlorination of water is necessary. How much more pleasant it would have been to the troops during the war if this discovery had been made half a dozen years ago!

THE Geological Survey has just issued another portion of the Memoirs on the Economic Geology of the Central Coalfield of Scotland, the present volume dealing with the fourth area into which the coalfield has been divided; this includes an area of rather more than 40 square miles, extending 10 miles to the west of Glasgow, both north and south of the Clyde. The district is not of any great economic interest; the ironstones are, for the most part, thin, and practically all the workable portions have been exhausted. Most of the coal-seams, too, are thin, and the quality is in many cases inferior. There are, however, two features of high geological interest, namely,

the great local thickening of one of the coals, known as the "Quarrelton thick coal," described as "certainly the thickest single accumulation of coal-matter in Britain," and the remarkable crush-zone known as the "Paisley Ruck." Both these are fully and exhaustively discussed in the memoir.

SOUTHPORT Meteorological Observations for 1919 have recently been published by the County Borough, the report being prepared by Mr. Joseph Baxendell. Hourly whole-year normals of several elements for periods ranging from ten to twenty years are given in diagram form as a frontispiece. The tabular statistics of air-pressure, temperature, sunshine, rainfall, wind direction and velocity, with other subsidiary matters, are given for several hours for each month and for the year with the differences from the normal. An outstanding feature of 1919 was the remarkable prevalence of winds from the north-westward, their duration surpassing that of winds from any other direction, which is quite unprecedented since the commencement of autographic records in 1898. The March of 1919 was the wettest experienced during the forty-eight years' existence of the observatory, and this was followed by a deficient rainfall for eight consecutive months. Atmospheric pollution is regularly measured at two different spots in Southport, and an attempt is made to compare the results with those from other places, but the observations to hand are by no means numerous. The recorded meteorological observations are of the highest order, and the report from year to year contains usually some special discussion—a feature in advance of the returns from most corporations. In the report for 1919 the special discussion is the diurnal variation of air-pressure from the averages of ten years, and associated with this is the range of the diurnal sea-breezes. Ten years are too few for such a discussion, and certain elements of irregularity cannot be eliminated in so short a period.

THE *Résumé* of the communications made to the French Physical Society on November 19 contains a short description of the spectrograph for ultra-violet work constructed by MM. J. Duclaux and P. Jeantet. The lenses of the collimator and camera are of quartz and the prism is of water between quartz plates. The whole is enclosed in a wooden box which is sufficiently gas-tight to allow non-absorbing gases to be substituted for air. With a water prism of 70° it is possible to photograph spectral lines from 6000 to 1850 tenth-metres. For light of wave-length less than 2000 water is more transparent than quartz, and throughout the whole of the ultra-violet the dispersion of water is greater than that of quartz. With a condenser spark the line 1862 may be photographed on a Schumann plate which is almost devoid of gelatine in 5 seconds. The only inconvenience of the water-prism for this work is the considerable change of the refractive index with temperature.

THE discovery of the nickel-steels of the invar type, possessing a very small coefficient of expansion, has had many valuable applications in metrology, but careful study has proved the existence of

residues, temporary or permanent, much resembling the anomalies in the expansion of glass. The cause of this instability has now been proved by M. Ch. Ed. Guillaume (*Comptes rendus*, November 29) to be the carbon in the alloy. The index of instability is arbitrarily defined as the elongation, in microns per metre, of a bar submitted to a heating for 100 hours at 100°C. , the only previous treatment being the air-cooling after forging. For an invar of average composition in the natural state this index has been found to be of the order of 30. The examination of a series of bars with gradually increasing and exactly determined percentages of carbon showed that the index of instability was a regular function of the carbon content, and approached the origin of the co-ordinates as the carbon approached zero. Cementite was regarded as the probable cause, and hence the addition of a metal having a higher affinity for carbon, such as chromium, tungsten, or vanadium, suggested a probable solution of the problem of removing, or at least of reducing, the cementite. Experiments made in this direction have proved successful, the addition of chromium, for example, to an invar containing 0.1 per cent. of carbon producing an alloy in which the index of instability is reduced to one-tenth of its original value. As the price of the increase in stability, the coefficient of expansion is slightly raised.

THE meeting of the Illuminating Engineering Society on December 14 was devoted to the presentation of reports on progress and to exhibits illustrating novelties in lighting. The number of committees working under the society has been increased, recent additions being committees to deal with progress in gas lamps and lighting appliances and with the measurement of light and illumination. Progress in the latter field was illustrated at the meeting by the exhibition of a new form of illumination-photometer enabling illumination to be determined by the inspection of a series of apertures of graded brightness without any manipulation being needed to secure a reading. Such instruments seem likely to be specially useful for demonstration purposes. Other features of interest among the exhibits included a demonstration of the latest form of Sheringham "artificial daylight" apparatus, which is now being made in a standardised form, and some small electrical gas-filled lamps with opal glass bulbs, shown by the Edison and Swan Electric Co. This firm also loaned for exhibition some new neon lamps of a very interesting character. Formerly such lamps, the light of which depends upon an electrical discharge through rarefied neon gas, required a relatively high voltage. But the lamps exhibited resembled an ordinary glow lamp in appearance, and could be inserted in an ordinary lamp-socket on 220 volts. The lamp exhibited was stated to consume only 5 watts, but the light consists of a relatively feeble orange glow at the negative electrode. It is thought, however, that such lamps will be useful as pilot lamps, etc., and in cases where only a very low candle-power is needed. At the conclusion of the meeting the chairman (Dr. A. H. Levy) announced that Mr. J. Herbert Parsons had accepted the presidency of the society in succession to Mr. A. P. Trotter.

THE results of recent investigations on the theory of development by Mr. A. H. Nietz, of which Dr. Mees, of the Kodak Research Laboratory, recently gave an account at the Royal Photographic Society, are given in the current (December) issue of the society's Journal. It is found that the "reduction potential" of a developer can be measured by finding the concentration of bromide required to give the same rate of change of depression of density, and this is the method for its estimation that is least subject to error. The relative reduction potentials of sixteen developing agents are given, beginning with ferrous oxalate as 0.3 and ending with diamidophenol as 30 to 40. The author says that it appears to be well founded that (1) the maximum density tends to increase with increasing reduction potential; (2) no definite relationship can be shown between the time of appearance and the reduction potential, nor is the velocity constant affected by the potential in any regular manner; (3) while the speeds of emulsions vary with the developer employed, they are apparently no function of the reduction potential; and (4) the fogging power of a developer also appears to have no relation to the reduction potential. The author also draws conclusions as to the effect of the structure of the molecule of the developer on its reduction potential. The amino-phenols are the most energetic, the hydroxy-phenols come next, and the amines follow. The introduction of a methyl group

into the nucleus or into an amino-group raises the energy, but two methyl groups are not always more effective than one; nuclear substitution of a halogen in the hydroxy-phenols raises the energy, and other less general statements are deduced. The growth of the image and of the fog do not generally follow the same law; evidence was found that fog is practically absent from the high densities and increases as the image density decreases, but bromide restrains the fog more than it restrains the image. Other allied subjects are considered.

MESSRS. J. WHELDON AND CO., 38 Great Queen Street, W.C.2, have just issued a noteworthy catalogue (New Series, No. 91) of books in the various branches of zoological science. It refers to upwards of 2000 volumes, classified under the subjects of Protozoa and micro-zoology, Coelenterata, Echinodermata, Annelida, Crustacea, Insecta and Arachnida, Mollusca and Polyzoa, parasitology, evolution, heredity, and hybridity. In addition, there is a list of sets and long runs of scientific periodicals which Messrs. Wheldon offer for sale.

A NEW edition of "The Resources of the Sea," by Prof. W. C. McIntosh, is announced for publication by the Cambridge University Press early in January. The work has been carefully revised and brought up to date. A chapter on the labours of the International Fisheries Council is promised.

Our Astronomical Column.

A NEW COMET.—Mr. Skjellerup, of Cape Town, has discovered a new comet 1920b; its position on December 13 at 12h. 57.4m. G.M.T. was R.A. 8h. 55m. 16.07s., S. decl. $9^{\circ} 1' 48''$; daily motion $+4m.$, N. $1^{\circ} 19'$. The comet is moving towards Regulus, and coming into a favourable position for northern observers. Its magnitude at discovery was $10\frac{1}{2}$. It will be remembered that Mr. Skjellerup discovered another comet a year ago; it was, however, unfavourably placed, and very few observations were secured.

Mr. Van Biesbroeck observed this comet at Yerkes Observatory on December 17d. 20h. 19.8m. G.M.T., R.A. 9h. 16m. 59.6s., S. decl. $3^{\circ} 10' 7''$. The average daily motion from December 13 to 17 is $+5m. 3s.$, N. $1^{\circ} 22'$. The comet is evidently not very distant from the earth; its motion is direct, and it will pass the ascending node in about ten days. It is visible in a small telescope.

TABLES DU MOUVEMENT KÉPLÉRIEN.—Ever since the enunciation of Kepler's laws efforts have been made to simplify the determination of true anomaly and radius vector in terms of the time. Many of the methods given are ingenious and useful, but none appear to give so rapid a solution as extended tables. Dr. M. F. Boquet, astronomer of the Paris Observatory, has just published a very useful volume with the aid of a grant from the Académie des Sciences; it gives for values of e ascending by intervals of 0.01 from 0.00 to 0.50, and for values of v ascending by intervals of 1° from 0° to 180° , the values of M and $\log r/a$ to three and five decimal places respectively, together with columns of differences for the variation of v and e . It is thus quite a short computation to find v and $\log r$ for a given value of M to $4''$ and to the fifth decimal place respectively.

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Examples are also given showing how the difference-columns may be utilised to obtain seven-figure accuracy by a straightforward computation. These tables will be a boon to all who desire to calculate ephemerides of short-period comets or minor planets. *A propos* of the latter point, it may be mentioned that the ephemeris of Ceres given in NATURE of December 9 is found to need the large correction of *minus* 4m. 40s. in right ascension. This large discordance emphasises the inconvenience resulting from the discontinuance of the accurate ephemerides of the four chief asteroids formerly published in the Nautical Almanac.

THE UCLE OBSERVATORY.—Tome xiv., fascicule iii., of the *Annales de l'Observatoire Royal de Belgique* shows that a considerable output of work went on at the Ucle Observatory even during the dark days of war. It contains micrometric measurements of 172 double stars made with the 38-cm. equatorial by G. van Biesbroeck. The mean result for Castor (epoch 1914.142) is $219.59^{\circ}, 5.30''$. The distance shows a marked diminution since about 1890, when the maximum, $5.76''$, was reached. So far as it goes, the above observation favours Mr. Lewis's minimum ellipse, the period of which is 310 years.

The *Annales* also contain a very fine series of cometary observations extending from 1913 to 1919; for example, Delavan's comet of 1913 was observed for position on seventy-three nights, and its magnitude determined on thirty-two nights. It remained a naked-eye object for nearly six months, attaining a maximum of 2.8 magnitude in mid-September, 1914. Among other methods that of extrafocal images was largely used. The comparison stars are thus expanded into discs, which renders them more readily comparable with a diffused body like a comet.